

## Engineering Institute Lecture Series



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### What's an Info-Gap and Why Should You Care?

Tuesday, November 20, 2012  
3:30 - 5:00 PM

MSL Auditorium (TA-3, Bldg 1698), Room A103

**Abstract:** Info-gap decision theory aims to facilitate decision-making in the face of uncertainty, particularly when there is little *a priori* information available about this uncertainty. Furthermore, info-gap analyses offer an intuitive mechanism by which the worst-case risks and the best-case rewards of particular decisions may be conveyed. This presentation attempts to shed light on info-gap decision theory and how it may be employed to better inform decision-making processes faced by scientists and engineers at *Los Alamos National Laboratory* (LANL). First, info-gap decision theory is applied to quantify the robustness to uncertain loading conditions of a cantilevered beam. This example is then tied to a discussion of the governing principles behind the theory. Following this discussion, the results from four example problems are presented: (1) numerical model selection given uncertainty in the calibration variables; (2) structural health monitoring system development given the expectation of uncertainty in data collected in the field; (3) understanding the predictive maturity of numerical models through robustness; and (4) path-planning in hostile, uncertain environments for mobile sensor nodes. The presentation is then concluded with a brief discussion of mission-relevant ideas for future research at LANL, as well as some practical considerations and limitations of the theory.

**Biography:** – Chris Stull joined Los Alamos National Laboratory as a postdoctoral research associate in May of 2010, and has since transitioned into a technical staff position with AET-6, the Non-Destructive Testing & Evaluation group at LANL. Since joining LANL, Chris has been involved with a number of projects ranging from *Verification and Validation* (V&V) and *Uncertainty Quantification* (UQ) of numerical models, to experimental testing of ground-based telescope systems. Chris' initial efforts at LANL focused on a framework to quantify the predictive maturity of codes/models for the DOE's *Nuclear Energy Advanced Modeling and Simulation* (NEAMS) Program. This work eventually lead Chris to info-gap decision theory: a theoretical framework that aims to inform robust decision-making in the face of severe uncertainty. This formed much of Chris' latter research efforts, with applications ranging from the selection of technologies for SHM system development to the assessment of path-planning strategies for mobile sensor nodes.

**Education:** Purdue University (BS, 2004); University of Pittsburgh (MS, 2006); Cornell University (PhD, 2010).

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